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ABSTRACT

Based on the inquiry method of learning, this instructional unit attempts to encourage students to discover for themselves the facts, problems, values, conflicts, and potential solutions of an environmental issue. Specifically, it deals with surface mining in the United States, with special focus on surface mining in Illinois. Materials and instructional strategies necessary for actual classroom use are presented, serving as a source of ideas and procedures for the teacher. Although planned for use in high school social studies classes, it may be adapted for other disciplines or integrated into other units. Chapter 1 defines the purpose, importance, significance, and terms of the topic and unit. Chapter 2 provides behavioral objectives, a list of instructional aids included in the unit, introductory activities, activities to provide further information, accumulative activities, and a means of student evaluation. Summary and conclusions are contained in Chapter 3. Appended material includes a list of free materials to send for and ten instructional aids: a questionnaire, test, coal production charts, mining terms, statements by governmental personnel, a slide presentation explanation, conflicting views on strip mining, a bibliography, and two magazine articles. (BL)

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AN ENVIRONMENTAL UNIT FOR THE SOCIAL STUDIES

by
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M.S. in Education, Southern Illinois University, 1972

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CHAPTER I

INTRODUCTION

Preparation to teach any body of knowledge requires extensive planning. By building learning experiences around an instructional unit, a teacher can provide unity within any instructional field. Today as man is becoming increasingly aware of his deteriorating environment, an environmental instructional unit is an especially relevant one. Since students learn best when they discover for themselves, a unit based on the inquiry method of learning can be very beneficial. This paper seeks to develop an environmental instructional unit based on the inquiry method to encourage students to discover for themselves the facts, problems, values, conflicts and potential solutions on an environmental issue.

Purpose

The purpose of this paper is to provide an instructional unit on surface mining in the United States, with special focus on surface mining in Illinois. It is intended that this unit will contain all the necessary materials and instructional strategies necessary for actual use in the classroom. For the purposes of this paper,

therefore, an instructional unit will be a planned series of materials and activities arranged around a particular topic to serve as a source of ideas and procedures for a teacher.

It was the intent of the author to make this unit based on an inquiry approach to an important environmental issue of the 1970's. For this paper, the inquiry approach is defined as a method of learning which stresses a process of thinking that follows steps similar to the scientific method as its approach to social studies problems. It employs directed discussions in which a teacher's questions serve as cues to students in teaching, and presents students with a representative sample of data on which social studies findings are based so that they can use this data to form hypotheses. Teachers and students using this unit are therefore strongly urged to send for the free materials which the organizations list in the Appendices--therefore giving a broader outlook on the problem of surface mining. Also activities through which students can gain knowledge and become involved are the primary thrust of this unit. An environmental issue is defined for this paper as one that involves a question or point of dispute concerning man's surroundings on earth. As such, surface mining has become an area of disagreement and question in the nation as all environmental issues have come to national attention in the past few years.

The grade level for this unit is not included because it is the author's contention that this unit can be modified to meet the needs of all high school students grades 9 through 12. Although the author planned the unit for use in social studies classes where environmental issues are being taken up for study, the use of this unit can be easily adapted for use by other disciplines or integrated into units in any class. Also there are more teaching procedures suggested in this unit than may be possible to use in the period normally allowed for such a unit. It is intended that only some of the activities be used, and the teacher is encouraged to be selective in choosing those best suited to his students' abilities and knowledge.

Significance of the Unit

The significance of this unit for teachers is quite obvious--it offers the teacher a "planned package." All of the materials and suggested activities are included (except those materials which the teacher is urged to send for) for those wishing to teach a unit on an environmental issue. The significance of this unit for students is that it is based on the inquiry method, which has become highly esteemed for its characteristics of stimulating student involvement and learning.

It is also necessary to show the significance of this unit as an environmental issue. To do this, it is necessary to look at the history

and importance of coal in the United States as well as the growth of surface mining to obtain this coal. For the purposes of this paper, surface mining will be the method of extraction of minerals from the earth by removal of surface soil with excavating equipment to expose a mineral seam. For the rest of this paper, this method will be referred to as strip mining. This paper deals exclusively with stripping for coal, since it accounts for 54 per cent of the land disturbed by strip mining, but it must be recognized that other materials such as stone, gravel, gold and iron are also extracted in this manner.[1]

As a fossil fuel, coal has been one of the nation's principal sources of energy for about two centuries. Demand for coal has risen steadily during the twentieth century, and in view of rising levels of use of energy in this nation and the world, this demand will not be lowered until advanced technology can provide a better or more efficient source. In fields where coal competes with other fuels, bituminous coal--which is the type of coal the United States has the largest quantity of--produced 31.7 per cent of the energy consumed in the United States in 1963.[2] It can be assumed that coal occupies a comparable position in the total energy picture today.

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[1]Conservation Foundation, C. F. Letter: A Report on Environmental Issues, January, 1972, p. 1.

[2]National Coal Association, Bituminous Coal Facts 1964 (Washington, D. C.), p. 5.

The reason for this continuing growth in the use of coal lies primarily in the fact that bituminous coal is America's most abundant fuel. United States reserves have been estimated to be approximately 3 trillion tons, about half of which are recoverable, while the other half may be too deep or of poor quality according to government estimates.[3] This abundance of coal is sufficient to last the United States well into the 21st century.

Coal is the principal source of energy for the United States electrical utilities. Outside of hydroelectric power, about two-thirds of the nation's electricity is generated by coal.[4] The steel industry is coal's second best customer, while aluminum production and the chemical industry also make heavy use of coal. Besides being abundant, coal has been attractive to these industries for its stable prices and the fact that the United States has reserves of good quality coal lying close to markets and available transportation.[5] So it is that the future of coal in the marketplace seems bright.

The controversy over coal lies in the methods used to obtain it. Strip mining is rapidly replacing underground digging methods. The

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[3]"Feds Eye Regulations for Strippers," Environmental Science and Technology, January, 1972, 1. 27.

[4]Coal Facts, p. 5.

[5]Ibid., p. 5.

United States Geological Survey estimates that some 128 billion tons of coal can be obtained by stripping in the future.[6]

Strip mining as a method was born in the mid-nineteenth century. But it did not become a popular recovering method until later on in the twentieth century. Early studies have estimated the 1930 strip mined output to represent less than 5 per cent of the total tonnage. By 1941 this figure had reached 10 per cent and by 1950 it was 20 per cent.[7] In 1965 the percentage was 35, and then 1970 saw another all-time high of 44 per cent.[8] The U. S. Geological Survey has estimated that this coal obtained by strip mining has disturbed land areas of more than 2450 square miles, or an area equivalent in size to the state of Delaware.[9]

The reasons for the growth of this method lie in the many advantages that stripping has over underground methods. A strip mine can be opened quickly because there is no need to provide for roofing or ventilation as in shaft or underground mines.[10] In general, strip

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[6]"Feds Eye Regulations," p. 27.

[7]C. L. Christenson, Economic Redevelopment in Bituminous Coal (Cambridge: Harvard University Press, 1962), p. 33.

[8]"Feds Eye Regulations," p. 27.

[9]Ibid., p. 27.

[10]Herman D. Graham, The Economics of Strip Coal Mining, University of Illinois Bulletin, Vol. ILVI (Urbana: University of Illinois, October, 1948), p. 19.

mines cost less than others and still turn out a product of uniform quality. Strip mining is a less complicated process, uses larger units of machinery to save in labor costs and recovers more coal than other methods. But it is also a safer method, with fewer accidents, and the work is easier to supervise.[11]

Despite its advantages, it also has many disadvantages which conservationists and environmental-minded citizens have begun to point out. Some operators are stripping up to 100 feel of soil to get at coal seams and then leaving the land in this overturned state.[12] As well as being ugly, stripping destroys wildlife, often pollutes rivers and water supplies, and results in erosion of the land.

As a result of these disadvantages, reclamation, or a process of seeking to restore the land to its former state, began. Through an expensive process--costing anywhere between $800 and $5000 per acre--some damaged land has been reclaimed. This amount is only estimated to be about one-third of the total amount stripped.[13] Still reclaiming the land by the planting of grasses, legumes and trees for private use for cattle grazing or such, or for public use for recreational activities, holds out hope for recovering use of the land.

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[11] Ibid., p. 25.

[12] Seth D. Woodruff, Methods of Working Coal and Metal Mines: Volume III, Planning and Operations (New York: Pergamon Press, 1966), p. 393.

[13] "Peeling Back the Land for Coal," Newsweek, June 28, 1971, p. 70.

In Illinois, stripping began in the 1920's. Today Illinois is one of the largest coal-producing states in the United States, and 50% of the coal she produces is obtained by stripping methods.[14] Obviously Illinois is part of the growing controversy over mining methods. Although only about one-third of one per cent of Illinois lands have been stripped, continuance of this method, as well as much unreclaimed land lying in waste, has made Illinois a good state to study as an example in this dispute over stripping.[15]

A battle over the ecological results of stripping has been developing for several years now. Outraged citizens and environmental lobbies such as the Sierra Club and the Conservation Foundation are taking one side claiming that strip mining is not cheaper because of the costs it passes on to society. On the other hand, the coal companies, the United Mine Workers and various trade associations counter that the nation has no other efficient available source of fuel at this time. So with the development of stripping as an environmental issue, regulation and reclamation have become important. Twenty-six states have laws regulating strip mining, but lack of enforcement and the fact that the laws specify steps to be taken instead of results

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[14]"Feds Eye Regulations," p. 28.

[15]John L. Roseberry, Report on a Survey of Potential Recreational Utilization of Illinois Strip-Mined Lands, Cooperative Wildlife Research, Southern Illinois University, p. 3.

to be achieved, has made most of these state laws failures.[16] Today both coal companies and environmental pressure groups are lobbying for federal control so that bills proposing total bans on stripping do not have to be considered as the outcry grows louder.

What is the future for strip mining? It is the author's contention that as consumption levels of energy rise, strip mining to recover coal will remain an important issue. Advanced technology will someday prove atomic or solar energy more efficient, but until then, stripping will have to be used and regulated. However, effective enforcement and control will not come about without an educated public willing to take a stand. It is for this reason that strip mining has significance for the social studies.

This significance for education, especially for the social studies, deserves a more detailed discussion. In a fast-changing world, education will have to concern itself with contemporary issues in order to prepare its students for citizenship in the last quarter of this century. Our school system is based on making men of judgment, and controversial issues and problems such as strip mining can and have been used to develop thinking citizens.[17] Wise

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[16]"Feds Eye Regulations," p. 29.

[17]William Ellens and Fins Engelman, "Man's Tomorrow," Phi Delta Kappan, June, 1965, p. 520 and 521.

treatment of controversial issues has been discussed by educators across the nation as making great contributions to the development of citizens who have achieved a balance ". . . between ability to make a fight and the ability to co-operate, and between fierce insistance on essential personal liberties and genuine appreciation of social action."[18]

The development of the above characteristics in students has been traditionally assigned to the social studies. The goal of social studies education has been citizenship education and the development of desirable behavior patterns for a free society. Since this behavior is rooted in values, beliefs and attitudes which must be solidly founded in knowledge, social studies has itself a difficult and important task.[19]

A belief in the ability to teach students to think for themselves and determine wise courses of action has long been an assumption of American education. This premise is well expressed in the State of Nebraska's Position on the Social Studies for Nebraska Schools. It states that "skill in the use of rational decision-making as a means of approaching the solution of personal as well as societal conflicts"

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[18]Fred T. Wilhelms, "Letter to a Teacher: On Handling Controversial Questions," Progressive Education, October, 1948, p. 11.

[19]Committee of the National Council for the Social Studies, "The Role of the Social Studies," Social Education, October, 1962, p. 316.

is one of the areas of citizen education for which social studies should assume responsibility.[20] But attainment of this and other goals in the social studies depends upon acquisition and utilization of information and data. Because factual learning has been found in general to be only retained for short periods, a method of discovery or inquiry has been emphasized for collection and analysis of data for problem solving. It is for this reason that this author has chosen to make this particular unit one based on the inquiry approach.

In today's heterogeneous society, more and more issues are bound to become controversial. If social studies education is to prepare the students of today for tomorrow's world, it must teach them to deal with these issues. Too many times in the past, education has not faced up to the crises facing American society as exemplified in the issues which the nation debates. Many young people have been alienated by focus on materials lacking in consequence. For this reason, curriculums with "content relevancy" need to be implemented.[21] What is learned in the schools must be applied to social action outside the school. With these concepts in mind, the author feels that the significance of this unit on strip mining for the social studies is self-evident.

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[20]Nebraska, Department of Education, A Position on K-12 Social Studies for Nebraska Schools, Lincoln, Nebraska, 1968, p. 11.

[21]John F. McAteer and Harry G. Miller, "Bring Content Relevancy to Social Studies," School and Community, May, 1971, p. 26.

Summary

Chapter I has been primarily interested in defining the purpose, importance, significance and terms of this paper. Chapter II will provide the behavioral objectives, the list of instructional materials provided in this unit, the introductory activities, the activities to provide further information, the accumulative activities, and a means of student evaluation.

Summary and conclusions will be contained in Chapter III. The Appendices at the end of this paper will include the list of materials to send for and the ten instructional aids provided by this unit. A bibliography will complete this paper.

CHAPTER II

OBJECTIVES

The objectives for this unit include the following:

A. Students will be able to demonstrate the mastery of the cognitive objectives listed below.

1. Tell in their own words what various environmental concepts mean.

2. Give examples of media advertisements which may help or hinder the environmental crisis.

3. Draw conclusions from the results of a survey of environmental values.

4. Read and comprehend various sources which discuss the importance of coal as an energy source and stripping as a means of obtaining it.

5. Design procedures for demonstrating to the rest of the class what they have learned from their readings.

6. Apply the knowledge they have gained about coal and strip mining to evaluate what they have learned by a visit to a strip mine.

7. Organize data about coal production in Illinois counties to make charts, maps and rankings of largest mines, etc.

8. Make generalizations about these arrangements of data which indicate the importance of strip mining to various Illinois counties.

9. Distinguish between fact and propaganda, relevant and irrelevant data when reading articles which present the viewpoints

of the coal companies and the environmentalists about strip mining.

10. Tell in their own words and defend the viewpoint of one side in the argument over stripping.

11. Appraise the value and need for strip mining in the United States.

12. State how they are affected by strip mining.

13. Integrate the knowledge they have gained to make tentative solutions for the future of strip mining.

B. Students will be able to demonstrate the mastery of the affective objectives listed below.

1. Show that they are developing their own beliefs about strip mining by participating actively in discussions on such.

2. Demonstrate ability to judge social policies by participation in discussions on existing laws on strip mining.

3. Indicate their involvement in the conflicting viewpoints surrounding strip mining by actively participating in a simulation of a small community deciding whether to change their zoning laws in order to allow a coal company to buy land.

4. Show an awareness of the environmental problems of the United States (especially that of strip mining) by writing to their state and national Congressmen.

5. Evidence acceptance of environmental values by continued reading and interest in strip mining and other issues.

Instructional Aids

The following are the instructional aids that are included in this unit:

Aid # 1: Sample questionnaire on environmental values

Aid # 2: Statements by John Quarles and Ken Hechler

Aid # 3: Chart of coal production and percentage obtained by strip mining in 1970

Aid # 4: Illinois strip mining law

Aid # 5: Chart of coal production in Illinois counties

Aid # 6: Important mining terms

Aid # 7: Slide presentation explanation

Aid # 8: Article on Captain Mine, Southwestern Illinois Coal Company, Percy, Illinois

Aid # 9: Conflicting viewpoints on strip mining

Aid # 10: Written test for unit evaluation

(All instructional aids listed above are included in the Appendices.)

Introductory Activities

In order to introduce students to the environmental crisis and the values surrounding it, and to get them involved in and aware of the problems, the following activities are suggested:

A. Show slides or film which depict various aspects of the environmental crisis. Have students jot down key words, concepts and phrases which are used to relate the issues in these presentations. Some suggested films are as follows:

"For All to Enjoy," Color, 20 1/2 minutes. A satirical approach to uncontrolled development in national parks. Produced by the Conservation Foundation and the National Park Service. 1968.

"A Matter of Time," Color, 27 minutes. Historical approach to environmental deterioration; designed to provoke discussion of a wide range of issues. Produced by the Conservation Foundation. 1967.

"The End of One," Color, 7 minutes. Produced by the Learning Corporation of America.

"The Silent Spring of Rachel Carson," Black and white, 54 minutes, by the University of California.

"Men at Bay," Color, 28 minutes, by King Screen Productions.

After the films are shown, have students tell in their own words what they feel the definitions of the various terms are. Later, look up the definitions in a dictionary. Some of the terms which may be discussed are as follows:

pollution
environment
overpopulation or population control
ecology
overproduction
conservation
survival

energy crisis
resources
recycling
sewage disposal
strip mining

Have students discuss issues raised by the films. Leading questions such as the following are suggested to get students involved:

Are these problems a threat to you?
Whose responsibility are these problems?
To whom does the environment belong?
Are there any solutions to these problems?
How can an individual participate in a solution?

B. 1. Have some students in the class make a careful log of T.V. and radio commercials which are pertinent to the environmental problems by the values or products they promote. Have them divide these advertisements in the following way:

Those which hinder the promotion of environmental solutions	Those which can be a help toward future solutions
Example: Pepsi and Coke in non-returnable bottles	Example: Smokey the Bear--"Only you can prevent forest fires."

Have students discuss their findings.

2. Have other students in the class collect pertinent articles from newspapers and magazines. Have them make an "Environmental Notebook" to store these articles in. Leave a few minutes at the beginning of each class period to report on and discuss any new articles students may have found before putting them in the notebook.

3. Have some of the more artistic students, or those interested in art, make a collage or mural with pictures and drawings of environmental problems. Display this mural in the classroom.

C. Have students make up a survey or questionnaire which would allow expression of environmental values. A sample questionnaire is included in this unit in the Appendices. Have students take the survey themselves and then itemize their answers. Then have them give the questionnaire to their fellow students, their family members and other community members. Itemize and summarize the results from these findings and compare them to the class's attitudes. Are they in agreement, are they more liberal or more conservative? Discuss the implications for environmental problems that these results may indicate.

Activities to Provide Further Information

In order to help students discover more information about strip mining, the following activities are suggested:

A. Have students look into the growth and significance of coal in the nation and the development of strip mining as a method to obtain it. It is suggested that students be referred to a wide range of sources, including the materials which the teacher was urged to send for. A few important materials have been abstracted as suggested handouts in this unit (these can be found in the Appendices.) Teachers are urged to make sure students discover answers for themselves from the various sources.

Individual presentations, or those involving two or three people, can be done by students to develop some of the various topics involved. Students should be urged to use charts, maps and other audio-visual aids to present their topic to the rest of the class. Some suggested topics for students to look into are as follows:

1. Why is coal important in the United States?
   a. what per cent of the total energy consumed in the U.S. is provided by coal?
   b. why is so much used?

2. What is coal used for and by whom?

3. What types of coal are mined in the U.S. and how are they mined?

4. Why is strip mining so widely used? What are the advantages to stripping? How much is stripped out of total coal mined in each state producing coal? A chart in the Appendices will help answer this question.

5. What are the coal reserves of the nation? How much has been used, how much is left and recoverable? Where are these reserves?

6. How is strip mining done? What are the types of strip mining; what types of machines are used?

7. What are the disadvantages and hazards of strip mining? What is pollution to water by stripping?

8. What are the special problems of strip mining in Appalachia, in Arizona (the Black Mesa Project)? Materials from the Mid-Appalachian Environmental Service and the Sierra Club can be helpful in answering these questions.

9. What laws are there in the nation and in Illinois on strip mining? A handout on Illinois law is provided in this unit in the Appendices.

10. How is reclamation of strip mined land done? What is grown on reclaimed land? How is water drained? These questions can be answered in part by bulletins received from the Mid-West Coal Producers Institute.

11. Where are the reclaimed lands in Illinois? What is being done with these reclaimed lands? These questions can also be answered in part by reference to bulletins from Mid-West Coal Producers Institute.

At the end of each student or group presentation, have students ask questions and discuss what was learned. Have students display their audio-visual aids on the bulletin boards for future reference. At the end of all the presentations, have students make generalizations on what they have learned.

B. Present students in small groups (2-3 students) with handout provided by this unit on coal production information for each county in Illinois (Aid # 5 in the Appendices). Have different groups take the various counties to work on the following suggested activities:

1. How much is produced in the county? How much is produced by strip mining?

2. What are the approximate locations of the mines? Have students make maps of each county with the approximate locations of mines.

Have students compile all of their findings to complete a ranking of the largest producing mines in Illinois and a map of all of Illinois with location of mines from the smaller county maps.

Discuss the findings the class has made:

1. What county is the largest strip mining producer?

2. What coal company produces the most coal by stripping in Illinois?

3. What per cent of Illinois coal production is mined by stripping?

C. Visit a strip mine. If it is not possible to visit a mine with the whole class, they can visit the Captain Mine in Percy, Illinois with the slide presentation included in this unit. (See Appendices.)

Before their visit, students should be presented with the handout included in this unit (see Appendices) on various common strip mining terms. A brief discussion may be needed.

1. If a class visit to a strip mine can be arranged, the teacher may wish to show the slide presentation to the class as an introduction.

At the mine students should be alerted to take note of the equipment and methods used. They should also be alerted to compare soil and life cycles to similar pieces of unstripped land, and to notice how wastes are disposed of.

Upon completion of the visit, have students write up a report of their visit as if they were newspaper reporters writing on the mine. Have students choose the best ones and submit them to the school paper for publication.

Discussions of their impressions of the mine would also be in order here. What conditions surprised students the most about strip mining operations?

2. If the class visit is to be only by slides, a handout on the author's visit with explanations of each slide is provided. Also an article on the Captain Mine is included (Appendix IX).

Accumulative Activities

To help the student draw together the things he has learned in this unit, the following simulation activity is suggested. The purpose of this simulation is to aid students in understanding the conflicting viewpoints which surround strip mining as an issue.

Right v. Responsibility in the Local Community

The setting for this simulation is a town council meeting (probably in Illinois) which is open to both the townspeople and the news media. The purpose of this meeting is to allow conflicting viewpoints to be heard on whether the town should pass a new zoning law which would allow a coal company to move into the area. Since the coal in the area is near the surface, the methods used will be those of strip mining, therefore involving much controversy for the townspeople. At the end of the meeting, a vote will be taken.

To represent the conflicting viewpoints, the class should be divided to represent the following groups:

Group	Group Size
Coal company	4 - 5
Mine workers	4 - 5
Conservationists	4 - 5
State government officials	2
Town mayor	1
Town secretary and assistant	2
Local citizens	4 - 5 or the rest of the class

Each group should elect a chairman and then go about compiling good arguments for their viewpoint. The handout included in this unit will provide a good starting point. From here, students should be referred to the information provided by the Mid-Appalachian Environmental Service as well as other materials. The local citizen group should be referred to studies done on the effects of strip mining on local communities.

When students are prepared, the Mayor should call the town meeting to order. Then the various groups (coal company, miners, and environmentalists) should be allowed to present their arguments for

or against the new zoning bill. They should each take from 5 to 15 minutes to state their views. Then state government officials will be called on to indicate what the state laws are on strip mining and what towns in the rest of the state have done in situations of a similar nature. The secretary and her assistant would be expected to take notes on what is said. Local citizens would be expected to ask pertinent questions of each of the groups when the floor is opened to debate. The groups would be expected to defend their viewpoints convincingly.

When sufficient time has been allowed for questions and discussions, have all students become local citizens. Allow for any further discussion, and then take a vote on whether the bill should be passed.

To conclude this activity, have students discuss the implications of their vote as related to what they feel will be the future of strip mining in their state. Do they feel that the ends justify the means? Is strip mining a direct threat to them?

Concluding Activity:

By the end of this unit, most students should have well-developed opinions on the advantages and disadvantages of strip coal mining. If students feel strongly about the need for more state or federal legislation, have them write to their Congressmen and to lobbying groups expressing these concerns.

If students desire more active participation in the solutions of environmental problems, have them join local environmental groups. If there are none such groups in the local community, have students start action to mobilize one.

Evaluation

Evaluation for an inquiry unit is often difficult since students generally learn more about values and methods of gathering data than they do about facts. For this reason the author feels major emphasis should be placed on student participation in activities and discussions. However, the teacher may feel he needs some objective measurement, and for this reason, a written test is included in this unit. Essay and objective items are each worth 50 per cent. It is suggested that the teacher give each student two grades--one for written work and one for participation in discussion and activities. A suggested breakdown of these two grades is as follows:

Written work grade:

Written test	50%
Introductory activities (T.V. and radio commercial logs or collection of articles or knowledge of terms and survey findings)	25%
Information activities (Reports on coal, analysis of coal production charts, report of visit to strip mine)	25%
	100%

Participation grade:

Simulation participation	50%
Introductory activities (Discussions of terms and films, survey participation)	25%
Information activities (Presentation of reports on coal, discussions on coal mining in various counties & on visit to mine)	25%
	100%

CHAPTER III

SUMMARY AND CONCLUSIONS

The purpose of this paper has been to develop an instructional unit concerning strip mining for use in a social studies classroom. Strip mining has been shown to be an important environmental issue of the 1970's which demands resolution and involvement on the part of the citizenry. It therefore warrants further study in today's schools.

The author planned the use of this unit for a social studies class, although other disciplines such as science or humanities may be able to adapt it to their needs. Today social studies education is changing to encompass many new fields and areas which traditionally were separate or "closed" areas of study. It is because of this interdisciplinary approach, that draws materials from a variety of academic areas, that social studies is particularly appropriate for the study of environmental issues.

Social studies today also places emphasis on the analysis of valuing and on the development of responsibility for self and society.[1]

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[1]Committee of the National Council for the Social Studies, "The Role of the Social Studies," Social Education, October, 1962, p. 315.

Controversial issues of our day also play an important role in the social studies curriculum. The importance of the inquiry method for learning in the social studies should also not be overlooked.[2]

Each of these characteristics demonstrates that a unit such as this, on an important environmental issue, will occupy a special place in the social studies curriculum. This unit has drawn from various fields for its information on strip mining. A special emphasis has been placed on valuing--an analysis of individual as well as societal environmental values. Through activities designed to get the students involved in these issues, it is hoped that students will develop a sense of civic responsibility for themselves and for their society. Strip mining is certainly a controversial issue, one that should hopefully help define student opinions, aid in active student involvement and lead to the formation of effective citizens for tomorrow's world. This unit also calls for students to discover facts, generalizations and conclusions for themselves. It is hoped that students will forget what they have learned less quickly because of this self-discovery approach to learning. It is also hoped that they will retain an understanding of the inquiry method itself, so that they can apply the critical thinking to other issues which surround them in and outside the classroom.

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[2]Nebraska, Department of Education, A Position on K-12 Social Studies for Nebraska Schools, Lincoln, Nebraska, 1968, p. 12.

Understanding society's values, development of effective citizens, ability to deal with controversial issues, ability to analyze and synthesize data and to form hypotheses so that students can carry a method of learning into daily life outside the school--all of these are social studies goals. It is no wonder then that a unit on an important environmental issue would find a special place within the social studies curriculum.

The author planned this unit as a "package" for teachers who wish to teach about an environmental issue. The importance of such a package for the teacher who has little time to compile such an effective unit himself cannot be denied. Because all of the activities are merely "suggested," it is hoped that the teacher will pick those for use which are best suited to his aims and the students' interests and needs, while also allowing for additional materials which may supplement or enrich the exercises provided. It has been found that most students are much more excited about learning when they can discover things themselves. For this reason, it is the author's hope that students will find this unit, based on the inquiry method, an exciting and relevant one.

In conclusion, the author feels that more units such as this one should be developed for the social studies. Other environmental issues such as air pollution, water pollution and overpopulation for

APPENDICES

example, can easily be developed into effective units for the social studies. Also, units on area poverty (poverty in Appalachia, in India, etc.), on race relations (the black man, the red man), on the cities, the family, crime and other pertinent problems of today's world can provide excellent learning experiences for students. It is this author's hope and assumption that instructional units to cover these topics will be developed in the future for use in the social studies--as well as other disciplines.

APPENDIX I

FREE MATERIALS TO SEND FOR

In preparation for this unit, it is urged and suggested that the teacher send to the following organizations for their free information on strip mining. The materials they will supply you with are listed below their addresses.

1. Department of Mines and Minerals
   State Office Building
   Springfield, Illinois 62701

   "Surface-Mined Land Conservation and Reclamation Act"
   "Rules and Regulations Pertaining to the Surface-Mined Land Conservation and Reclamation Act"
   "1970 Annual Report: Surface-Mined Land Reclamation"

2. Illinois State Geological Survey
   Natural Resources Building
   Urbana, Illinois 61801

   A list of publications, especially those available on coal maps, from the Survey may be helpful.

3. Mid-West Coal Producers Institute
   Suite 200 - Reisch Building
   117 South 5th Street
   Springfield, Illinois 62701

   "Surface Mining--Problem or Opportunity," a statement by the Soil Conservation Society of America
   "The Economics of Strip Coal Mining," a University of Illinois Bulletin
   "Reclaiming Illinois Strip Coal Land with Legumes and Grasses," a University of Illinois Bulletin
   "Reclaiming Illinois Strip Coal Land by Forest Planting," a University of Illinois Bulletin
   "The Potential of Wildlife Management on Strip-Mined Areas," by William D. Klimstra

"Strip Coal Mining . . . The Total-Benefit Industry," reprinted from Coal Age, April, 1966
"Effects of Strip Mining and Technological Change on Communities and Natural Resources in Indiana's Coal Mining Region," a Research Bulletin
"Report on a Survey of Potential Recreational Utilization of Illinois Strip Mined Lands," Southern Illinois University, Co-operative Wildlife Research Lab
"Recreational Activities on Illinois Strip Mined Lands," Journal of Soil and Water Conservation, May-June, 1964

4. Research Director
Mid-Appalachian Environmental Service
1218 Quarrier Street
Charleston, West Virginia 25301

Basic information kit containing:
a neutral discussion paper
two pro-industry publications
two anti-industry publications

5. Environmental Protection Agency
Washington, D. C. 20460

"Mine Acids: Better Water for America"
"Mine Drainage Treatment: State of the Art and Research Needs"
Statement by John Quarles, Jr. before a Senate Committee in November, 1971, on coal mining

6. The Sierra Club
1050 Mills Tower
San Francisco, California 94104

"The Rape of Black Mesa," by William Brown
"The Stripmining of America," by Wayne Davis

7. The Conservation Foundation
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036

C.F. Letter, Focus on Strip Mining in January, 1972 issue

8. Friends of the Earth
529 Commercial Street
San Francisco, California 94111

Not Man Apart, Focus on Strip Mining in July, 1971 issue

APPENDIX II

AID # 1: SAMPLE QUESTIONNAIRE ON ENVIRONMENTAL VALUES

Answer the following questions by putting the letter of your choice in the blank provided at the left.

_____ 1. To whom does the air belong?

a. to all men
b. to the government
c. to the various individuals or organizations whom own the land below the air
d. other, please specify _____

_____ 2. To whom does water belong?

a. to all men
b. to the government
c. to those who own the land which holds it
d. other, please specify _____

_____ 3. To whom does the land belong?

a. to all men
b. to the government
c. to those who have the property rights
d. other, please specify _____

_____ 4. To whom do natural resources belong?

a. to all men
b. to the government
c. to those that own the land containing these resources
d. other, please specify _____

_____ 5. Who is responsible for damage being done today to our environment by air, water or land pollution?

a. all men, or society
b. the government
c. those who do the actual polluting
d. other _____

_____ 6. Who should pay the bill for pollution to air, water or land by industries?

a. society
b. the government
c. the industry that does the polluting
d. other _____

_____ 7. Who should be assigned the task of cleaning up the nation's pollution and environmental problems?

a. all men, working together or working alone
b. the government
c. those who do the polluting
d. other _____

_____ 8. Which pollution problem threatens your life or seems most important to you at this time?

a. air pollution
b. water pollution
c. land pollution
d. all of these
e. none of these
f. other _____

9. Would you be willing to pay higher taxes or accept higher prices in order to help defray the cost of a cleaner environment?

Yes _____
No _____

10. Put a yes or a no to the left of each of the following actions to indicate whether you feel individuals (like yourself) ought to follow them:

_____ a. Write your Congressmen about your concern over environmental problems.

_____ b. Boycott non-returnable glasses and containers.

_____ c. Use only recyclable containers. Take your own containers to the supermarket, empty products into them, and leave all commercial packaging at the counter.

_____ d. Use public transportation whenever possible. Walk or ride a bike whenever you can.

_____ e. Join environmental groups.

_____ f. Use only low-lead gasoline in your car.

_____ g. Save water. Put bricks in your toilet so it uses less water when flushed.

_____ h. Avoid use of unnecessary electrical appliances.

APPENDIX III

AID # 2: STATEMENTS BY JOHN QUARLES AND KEN HECHLER

(For use with Introductory Activities on Strip Mining)

A. Statement by John Quarles

In presenting these points before a Senate subcommittee, Mr. Quarles of the Federal Environmental Protection Agency, was emphasizing the need for favorable action on a bill containing federal controls for mining:

> Mining inevitably involves some gouging of the surface and subsurface of the earth. If improperly performed, mining causes damage intolerable by present environmental standards. At the same time, however, it supplies this Nation with the basic raw materials necessary to sustain the needs of our society. Some sincere conservationists support the prohibition of many forms of mining; others propose to control only surface mining. Some would ban all surface mining of coal. On the other hand, many mine operators oppose the regulation of mining on the grounds that environmental control measures may force them out of business or otherwise reduce the Nation's supply of minearls. A system is clearly needed which will prevent undue environmental damage from mining activities and which will assure the restoration of areas which are unavoidably damaged. At the same time, such a system should not arbitrarily prohibit the mining of minerals needed to sustain a healthy economy . . . .
>
> . . . If we are to provide for a total program for environmental protection and enhancement, it seems to me that the key lies in an effective program of land-use planning. Mining is only one use alternative for an area of

land. Planning in advance of land use is a necessity; that is, the impact of a given proposed use of land, in this case mining, must be considered in detail before the land has been modified, or before a surface pit is excavated or a mine shaft sunk or before the land resources in question have been otherwise irretrievably committed. Further, the use of land for mining must be considered with other alternative uses, such as recreation, grazing, forestry, aesthetics and wildlife preservation.

Two important questions must be asked and answered before mining should be permitted.

1. Is it feasible, at a given site, to carry out mining activities without violating water quality standards or unduly impairing other important environmental values? If not, mining should be prohibited.
2. If mining is to be conducted, what precautionary measures must be taken to protect and restore the environment during and following mining?

The best available information indicates that both surface and underground mining have affected more than 13 million acres in this country. This acreage grows daily and is expected to reach 20 million acres by the year 2000.

The majority of mining operations have been undertaken without adequate preplanning. The results are deplorable:

-- Millions of dollars in property damage and the threat of subsidence or cave-ins in more than 250 communities in 28 states.
-- Uncontrolled mine and refuse bank fires which have resulted in the deaths of 50 people and the destruction of property valued at more than $2 billion.
-- Thousands of miles of streams either intermittently or permanently damaged.
-- Several million acres of deteriorating mined land contributing to land, water and aesthetic pollution . . . .

. . . It has been argued that this framework [for effective control] already exists in the variety of state statutes which have been enacted to control surface mining activities, and that as much as 90 per cent of the surface-mined coal in the United States is covered by such statutes. Nevertheless, although surface mining, particularly surface

> mining of coal, presents serious environmental problems, other types of mining also create significant hazards to the environment. Despite the efforts of some states in this regard, the problems are still very much with us. Many of the state statutes are inadequate and ambiguous; some do not admit of equitable enforcement. State enforcement has been hampered by lack of funds and personnel. In addition, most of the state laws, like many of the bills before you today, are too limited in coverage to provide a comprehensive remedy for the problem . . . .

SOURCE: Statement of John R. Quarles, Jr., Assistant Administrator for Enforcement and General Counsel, Environmental Protection Agency, Before the Subcommittee on Minerals, Materials and Fuels, Committee on Interior and Insular Affairs, United States Senate, November 16, 1971.

B. Statement by Congressman Ken Hechler

In presenting these views in a Friends of the Earth magazine, Congressman Ken Hechler of West Virginia was hoping to build up more grassroots support for his bill on strip mining:

> . . . On February 18, 1971, I introduced H.R. 4556, to ban all strip mining of coal six months after the enactment of the bill and to prohibit any underground mining of coal in national forest and wilderness areas. . . . The response to my bill was immediate and heartening. Over 30 members of the House of Representatives were the initial co-sponsors, and this number has since swelled to 85 Congressmen from 26 different states. Four Senators--Nelson of Wisconsin, McGovern of South Dakota, Case of New Jersey and Kennedy of Massachusetts--are also co-sponsors. A flood of popular support in letters, telegrams and phone calls has welled up from all over the nation.
>
> . . . Carl Bagge, President of the National Coal Association, has led the charge against H.R. 4556, on the grounds it would cause an immediate 'energy crisis' by depriving the

nation of over one-third of its coal. He overlooks the 750 billion tons of coal recoverable by underground mining.

. . . A second argument levelled by the lobbyists against H.R. 4556 is that it will throw thousands of people out of work . . . . Many of the jobs in strip mining are highly skilled occupations, easily transferable to road construction or housing . . . .

. . . The third argument advanced is that 'reclamation' can make strip-mined land better than it was before it was disturbed . . . . The fact is that if enough money is poured into a 'showcase model' which photographs well in color, it is possible to reclaim stripped land, but it is uneconomic to pour that kind of money to 'reclaim' all stripped land . . . .

SOURCE: "Strip Mining: A Clear and Present Danger," by Congressman Ken Hechler of West Virginia, in Not Man Apart, July, 1971.

APPENDIX IV

AID # 3: CHART OF TOTAL COAL PRODUCTION BY STRIPPING

(To be Used with Activities to Provide Further Information)

State	Total Production in Short Tons (1970)	Percentage Obtained by Strip Mining (1970)
Alabama	20,560	55.8
Alaska	549	100
Arizona	132	100
Arkansas	268	81
Colorado	6,025	36
Illinois	65,119	50.7
Indiana	22,263	90.7
Iowa	987	57.2
Kansas	1,627	100
Kentucky	125,305	50
Missouri	4,447	100
Montana	3,447	99.2
North Dakota . .	5,639	100
New Mexico . . .	7,361	87.3
Ohio	55,351	67.3
Oklahoma	2,427	91
Pennsylvania . .	80,491	31.2
Tennessee	8,237	47.2
Virginia	35,016	20
West Virginia . .	144,072	19.2
Wyoming	7,222	98.4

SOURCE: "Feds Eye Regulations for Strippers," Environmental Science and Technology, January, 1972, p. 28.

APPENDIX V

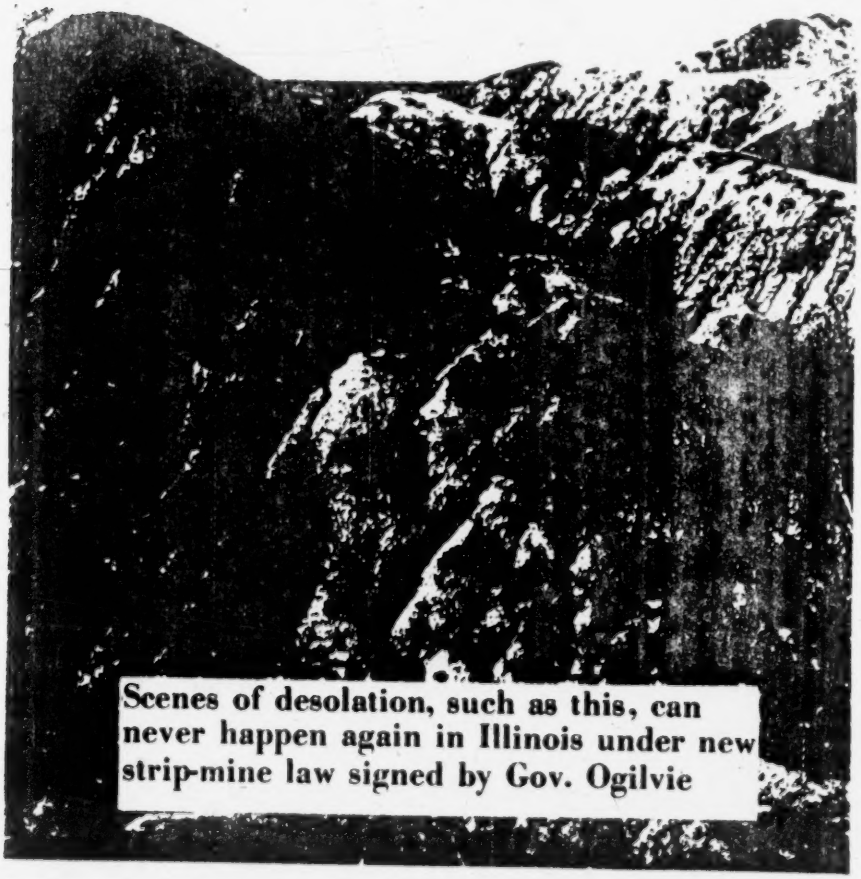
AID # 4: ILLINOIS STRIP MINING LAW

Strip mine bill requiring environmental protection signed into law by Ogilvie

PRAIRIE STATE...where tall grasses grew...buffalo roamed...wigwams silhouetted themselves against a blue horizon...where pioneers settled... tall corn grew...cattle grazed...where coal of high sulfuric content was found...where uncontrolled strip-mining destroyed the face of the earth, leaving behind the stark madness pictured on our cover...much like others throughout the state, this is a scene found today at the site of an abandoned mine near Ottawa in LaSalle county.

Governor's Advisory Council News

November, 1971



Scenes of desolation, such as this, can never happen again in Illinois under new strip-mine law signed by Gov. Ogilvie

A tough program for returning land scarred by strip mines to productive use has been signed into law by Gov. Ogilvie.

The governor's approval of the strip mine bill (HB 1626) highlighted action on several approved bills which have strengthened the state's program for protecting the environment. Ogilvie commented:

"Legislation which I recommended and the General Assembly passed in 1970 gave Illinois the toughest anti-pollution machinery in the nation.

"Now, we are closing the gaps in that law, and making it an even stronger weapon in the fight for our environment.

"This legislation will compel surface mining to take its place within the total context of present and future environmental quality. The law will be strictly and fully enforced.

"I have instructed the Department of Mines and Minerals to rely on the Department of Conservation for all the conservation expertise required under this law. And I have ordered the Institute for Environmental Quality to constantly monitor the effectiveness of this law and to report to me and to the General Assembly.

"This legislation is a major victory for the people of Illinois."

The new law makes far-reaching changes in existing regulation of strip mines, including the following:

--A feasible plan for reclaiming land must be approved before mining can begin. Land which cannot be reclaimed may not be stripped.

--Performance bonds covering the entire cost of the reclamation must be filed. Current requirements are too low.

--Local governments must be allowed to participate in the relcamation process. Although the localities are closest to the waste and destruction, they play no role under the existing law.

--The long and short-term environmental impact of the strip mining must be determined before mining can begin. Current law does not consider environmental factors.

Ogilvie noted that the procedures in the new law provide for effective retulation without imposing a total ban on strip mining.

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APPENDIX VI

AID # 5: CHART ON COAL PRODUCTION IN ILLINOIS COUNTIES

Name of Operator	Post Office Address	Total Employees	Days of Active Operation	Total Mined by Machine 1970	Total Mined in Strip Mines 1970
Christian County					
Peabody	Pawnee	965	243	4,899,783	--
Douglas County					
Moffat	Murdock	175	287	1,140,162	--
Franklin County					
Old Ben	Sesser	339	278	2,178,503	--
Freeman	W. Franklin	323	243	1,032,108	--
Old Ben	Benton	319	275	2,823,225	--
Old Ben	Sesser	339	267	2,290,198	--
Fulton County					
United Electrical	Cuba	92	194	--	745,415
U. Electrical	Canton	238	266	--	2,162,051
Peabody	Fairview	60	225	--	407,069
Midland (Asarco)	Fairview	60	28	--	38,510
Ayrshire	Vermont	98	251	--	916,775
Truax-Traer	Norris	217	239	--	1,810,523
Gallatin County					
Peabody-Eagle	Shawneetown	100	354	--	749,481
Peabody-Eagle 1	Shawneetown	257	243	1,186,804	--
Peabody-Eagle 2	Shawneetown	401	245	962,455	--

Jackson County						
Tab Mining	Carbondale	14	180	--		84,261
Royal Mining	Carterville	4	114	--		50,225
Jefferson County						
Freeman	Waltonville	630	234	2,656,613	--	
Inland Steel	Sesser	398	238	1,928,183	--	
Freeman	Waltonville	322	262	1,809,816	--	
Eads	Belle Rive	45	12	--		48,000
Johnson County						
New Burnside	Christopher	8	30	--		1,474
Holly Mining	Antioch	9	20	--		2,542
Kankakee County						
Peabody	S. Wilmington	160	267	--		976,019
Knox County						
Peabody	Victoria	144	234	--		1,528,477
Midland	Victoria	144	26	--		147,496
Macoupin County						
Monterey	Carlinville	171	139	261,563	--	
Mercer County						
Hazel Dell	New Windsor	11	225	35,613	--	
Viola Materials	Viola	4	14	--		6,057
Montgomery County						
Freeman	Farmerville	465	232	1,807,263	--	
Truax-Traer	Coffeen	161	221	924,960	--	
Peoria County						
Peabody	Trivoli	141	217	--		1,091,739
Midland	Trivoli	141	35	--		157,355
Peabody	Edwards	81	267	--		612,579
Midland	Edwards	81	32	--		79,456
United Elec.	Glasford	65	263	--		757,784
Perry County						
United Elec.	DuQuoin	182	266	--		1,986,158
Truax-Traer	DuQuoin	207	237	--		2,194,517
Southwestern Ill.	Percy	194	279	--		4,208,631

Pope County					
Mt. Zion	Marion	8	28	--	5,955
E & L Coal	Marion	3	84	--	6,013
Randolph County					
SouthwesternIll.	Percy	139	289	--	1,506,436
Zeigler Coal	Sparta	181	230	827,459	--
Truax-Traer	Sparta	119	237	--	1,266,968
St. Clair County					
Peabody	Freeburg	330	275	--	4,637,688
Peabody	Millstadt	102	103	184,372	--
Peabody	Freeburg	145	186	248,480	--
Peabody	Millstadt	102	172	349,403	--
Belle Valley	Belleville	39	102	43,079	--
Peabody	Millstadt	80	277	--	710,836
Saline County					
Sahara	Harrisburg	148	225	--	855,443
Sahara	Harrisburg	183	243	658,928	--
Sahara	Harrisburg	130	237	647,469	--
Houston	Carrier Mills	3	267	--	17,119
Sahara	Harrisburg	110	187	212,719	--
Big Ridge	Harrisburg	5	198	--	28,477
Stark County					
Peabody	Wyoming	132	177	--	622,360
Midland	Wyoming	132	28	--	105,208
Vermilion County					
Ayrshire	Danville	79	58	--	184,873
Deep Valley	Danville	6	82	2,821	--
V-Day Coal	Danville	24	207	62,277	--
Williamson County					
Ayrshire	Marion	124	231	--	1,082,627
Bell & Zoller	JohnstonCity	266	229	1,069,234	--
Forsyth-Energy	Herrin	56	224	--	437,736
Freeman	Marion	249	231	1,135,089	--
Peabody	Stonefort	138	249	--	1,036,773
Barbara Kay	Marion	35	212	130,796	--
Harrisburg	Marion	28	222	106,195	--
Cold Water	Herrin	2	27	--	1,426

SOURCE: State of Illinois, Department of Mines, Minerals and Fuels, 1970 Annual Coal, Oil and Report.

APPENDIX VII

AID # 6: IMPORTANT MINING TERMS

(To be studied before a visit to a strip mine.)

ACID-FORMING MATERIALS: those materials capable of producing toxic conditions when exposed.

BOXCUT: the first open cut which results in the placing of overburden on unmined land adjacent to the initial pit and normally outside of the area to be mined.

CONSOLIDATED MATERIALS: those of sufficient hardness or ability to resist weathering and to inhibit erosion or sloughing.

FINAL CUT: the last pit created in a surface-mined area.

GOB: that portion of refuge consisting of waste coal, rock, slate and/or other unmerchantable material of relatively large size which is separated from the mineral in the cleaning process.

HIGH WALL: that side of the pit adjacent to unmined land.

OVERBURDEN: all the earth and other materials which lie over natural deposits of coal, clay, stone, sand, gravel and other materials; also such earth and other materials disturbed from their natural state in the process of strip mining.

PEAK: a projecting point of overburden created in surface mining processes.

PIT: a tract of land from which overburden has been removed.

REFUGE: all waste materials connected directly with the cleaning and preparation of minerals mined.

SLURRY: that portion of refuge separated from the mineral in the cleaning process which consists of materials readily pumpable.

TOXIC CONDITIONS: those which will not support higher forms of plant or animal life in connection with the mining operations.

SOURCE: Condensed from Rules and Regulations Pertaining to the Surface-Mined Land Conservation and Reclamation Act, State of Illinois, Department of Mines and Minerals.

APPENDIX VIII

AID # 7: SLIDE PRESENTATION EXPLANATION

The Captain Mine, owned by Southwestern Illinois Coal Corporation in Percy, Illinois, is one of the largest coal producing mines in Illinois. According to the 1970 Annual Report by the Illinois Department of Mines and Minerals, the Captain Mine was second in production only to the Peabody River King Mine in Freeburg. The Captain Mine was opened in 1964, and had produced 29,793,513 tons up to 1970, averaging between 4 and 6 million tons per year. All of this production is done by stripping, and for this reason, the author chose to visit this mine on July 1, 1972. Mr. Leo Morski, a geologist who worked for the company, took the author around the mine, explained various operations, and allowed the taking of slides which accompany this unit.

Slides numbered one through four are of the stripping machine used at Captain, called the Marion 6360. (See also Aid # 8.) It is the largest of its type made and operates 24 hours a day--stopping only in severe weather conditions. In slide # 3 one can see some of the lights which allow the operator of the machine to see at night. Three men are needed to operate this machine which weighs 14,000 tons and is

large enough for a truck to drive underneath it because of its 16 foot vertical clearance. (All of the approximately 160 employees at this mine work in one of three shifts which keep the mine operating continually.) Slide #4A shows the shovel of the 6360, which has a 180 cubic yard dipper. Slide #4B shows the coal bed from which this machine is taking the coal, while #5 and 6 show the smaller stripping machine which is also being used at Captain Mine because the mine has a 2-seam stripping operation.

Slide #7 is of a drill used at Captain to help break up some of the overburden. The large coal haulers in use at Captain are seen in slides 8 and 9. Some of these trucks have a capacity of 240 tons.

Slides #10 and 11 show the coal preparation plant at Captain where the coal is cleaned and separated before being shipped out. All coal from this mine is loaded into railroad cars located at the mine after being separated. The coal is then sent to either of two electric companies--Stateline or Commonwealth Edison--where it is used to help generate electricity.

Reclamation of stripped mine land in Illinois is a law which the Captain Mine is obeying. Slides #12 and 13 are examples of land which has not yet been reclaimed at Captain. Reclamation costs are approximately $800 per acre at Captain. Southwestern Coal Corporation is keeping its mined land rather than reselling it. An example of

use they are putting it to is in slide #14. The land is leveled, re-seeded by airplane, and then used for the raising of cattle. Cattle owned by Southwestern can be seen in the distance in slide #15.

The stripping operations at Captain are moving in a northerly direction and are presently working on a coal seam five or six feet deep. Authorities at the mine estimate that there is enough coal in the land they are operating at to keep it open and producing coal for the state of Illinois until the year 2000.

APPENDIX IX - Aid #8: Article on Captain Mine.

Stripping Two Seams at Captain with a 180-Cu Yd Dipper.
Reprinted from Coal Age, February, 1966

Copyright 1966, McGraw-Hill, Inc., 300 West 42nd Street, New York, N.Y.

APPENDIX X

AID # 9: CONFLICTING VIEWPOINTS ON STRIP MINING

(For use in accumulative activities)

A. A miner's position:

> . . . we in the mining industry are conservation minded at heart, with our mineral resources. I firmly believe most of the people, in most mining companies, are aware and have no quarrel with conservation of our environment. After all, we drink the same water, breathe the same air, and are much more concerned with its quality than most people.
>
> . . . At mining conventions during 1970, much time was devoted to ecology, environment, and the image mining has in the mind of the general public. Many interesting facts were revealed.
>
> Strategic mineral development is the highest use of land because of the great values to the nation from small areas. Mining will disturb only about one per cent of the 760 million acres in federal ownership.
>
> After a century of exploration, the fear that restoration of withdrawn lands to jurisdiction of the mineral laws will result in wholesale devastation of the landscape is wholly unfounded. The remaining 99 per cent of the 760 million acres ought to be sufficient for the non-mineral users!

Condensed from: "Open Pit Mining," by P. T. Peterson. Mining Congress Journal, February, 1971, p. 65.

B. A conservationist's position:

> . . . The supposedly 'cheap' coal derived from strip mining actually imposes heavy external costs, most of which are passed unhesitatingly on to society by the strip mine operator.
>
> At its worst, stripping brings indescribable ugliness, destroying natural systems and, with them, tourist and recreational resources, wildlife habitat and other values. It pollutes rivers and water supplies with silt and acid drainage. It leaves denuded lands and spoil banks, which are often shoved over hillsides. Among the results are serious erosion, landslides and flooding (due to greater run-off from bare areas and reduced capacities of sediment-choked streams). Damage to roads and bridges from heavy trucks can be severe. Blasting can cause both property and psychological damage. In short, strip mining is often disruptive of both natural and community environments.
>
> . . . Industry, with intensive, large-scale lobbying and public relations campaigns to forestall restrictive legislation and enforcement, dwells on the employment and energy issues. These are certainly important considerations, as is the fact that strip mining is considered roughtly twice as safe as deep mining. But many arguments have been made by environmentalists that these factors can be mitigated so as to avoid serious social distress.
>
> A prime suggestion is greater emphasis on alternative sources of fuel supply. It is also argued that unemployment problems resulting from a ban on contour and auger mining could be alleviated with short-term federal assistance and job relocations in deep mining, reclamation and the like. This would involve an estimated 14,000 mine workers and a roughly equal number of people in related industries. Finally, there is the belief that deep mining can be made safer with better techniques and law enforcement . . . .

Condensed from: Conservation Foundation Letter, A Report on Environmental Issues, January, 1972, p. 1 & 2.

APPENDIX XI

AID # 10: WRITTEN TEST FOR UNIT EVALUATION

(To be used as a means of student evaluation)

I. MULTIPLE CHOICE: In each question below, select the best answer (or answers) and write the letter (s) on the line at the left.

_____ 1. Coal supplies approximately what percentage of the energy consumed in the United States?

a. 80%
b. 30%
c. 55%
d. 10%

_____ 2. Which of the following is not a reason for the rapid growth in the use of coal in this nation?

a. its prices have remained fairly stable over the years.
b. it is very abundant in the U. S.
c. its use pollutes the environment less than other fuels.
d. it is found close to markets with good transportation available.

_____ 3. Studies of the effects of large-scale strip mining have shown that:

a. non-agricultural land owners become important.
b. the number of farms decreases.
c. the tax base suddenly decreases.
d. the community becomes more stable in population.

_____ 4. The majority (over 60%) of all land stripped in Illinois is owned by the following:

a. coal companies.
b. private individuals.
c. state government.
d. local government.

_____ 5. The public outcry for federal regulation of strip mining is endorsed by which of the following groups?

a. The Conservation Foundation.
b. The Sierra Club.
c. Mid-West Coal Producers Institute.
d. National Coal Association.
e. Environmental Protection Agency.

II. MATCHING: Choose the statement from Column B which best defines the term in Column A and write the letter in the space provided.

Column A	Column B
_____ 6. overburden	a. is adjacent to unmined land
_____ 7. pit	b. land from which overburden has been removed
_____ 8. gob	c. refuge which can be pumped
_____ 9. slurry	d. conditions which will not support plant or animal life
_____ 10. high wall	e. earth and other materials that lie over a mineral seam
	f. refuge pieces of large size
	g. materials of sufficient hardness to resist weathering or erosion

III. LISTING: List the three general types of strip mining for coal and briefly explain each method in the space below.

11.

12.

13.

Name <u>two</u> of the four largest coal-producing states in the U. S.

14.

15.

Name <u>two</u> of the five largest coal-producing counties in Illinois.

16.

17.

IV. ESSAY: Use the space below each question (and the back side of this paper if necessary) for your answer.

18. Using the knowledge you have gained from this unit, write a short paragraph on what you feel will be the future of strip mining in the U.S. Be sure to state your reasons.

19. Write a short paragraph stating and explaining what the costs to society from strip mining are.

20. Read the following paragraph and then answer the questions below it in a short statement.

What more will be done with mined land only time will reveal. But it can be accepted that with the imaginative approach, backed up by research, the present broad list of uses will be broader still. For example, will the openings made by the strip-mining machines as they uncover and remove the coal provide a practical solution to the problem of disposing of old automobiles--and other unwanted by-products of modern living? Dumped into the pits and covered up, the wornout gas chariots would no longer be the outstanding landscape blots they presently are. Other solid refuge might be disposed of more cheaply, conveniently and permanently, and without creating other undesirable by-products, such as smoke and fumes from burning.

Do you think this may be a practical solution in the use of strip mined land?
What advantages would it offer?
What limitations would there be?
Who do you think suggested this idea, a coal company or a conservationist? Why do you think so?

(Key for written test)

Parts I and II are worth 15 points each (2 points for each item). Part III is worth 20 points (2 points for each correct item and 2 points for the explanation called for on the types of strip mining). Part IV is worth 50 points (questions 18 & 19 worth 15 each and question 20 worth 20 points). Total number of points is 100--for easy grading.

I.
1. b
2. c
3. a, b
4. a
5. a, b, c, d, e

II.
6. e
7. b
8. f
9. c
10. a

III. 11. contour stripping--follows contours of steeply sloping land, cutting often into mountains.

12. auger stripping--coal is drilled by huge bits out of hillsides, often behind the contour stripping.

13. area stripping--trenches are dug in flat or very gently sloping land.

14.-15. Students should be given credit for any two of the following answers:

Kentucky, West Virginia, Pennsylvania, or Illinois

16.-17. Students should be given credit for any two of the following answers:

Franklin, Perry, Jefferson, Fulton or St. Clair

IV. 18. A good answer to this question must necessarily represent what the individual teacher has emphasized.

19. An explanation of the costs in higher taxes and higher prices as well as loss of natural systems, wildlife and aesthic values, and impact of pollution and erosion problems would most likely be involved in an adequate answer to this question.

20. This paragraph was written by a coal company ("Strip Coal Mining . . . The Total Benefit Industry," Coal Age, April, 1966). Advantages of such a solution are obvious--it is an easy solution to a waste problem. Disadvantages are possible future pollution hazards. Whether it is a practical solution will probably lie in the student's reasons for his opinion.

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